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**AD NUMBER**

AD376823

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**FROM:** confidential

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Distribution: USGO: others to Director,  
Defense Nuclear Agency, Attn: STTI.  
Washington, DC 20305.

**AUTHORITY**

DSWA ltr., 9 Apr 97; DSWA ltr., 9 Apr 97

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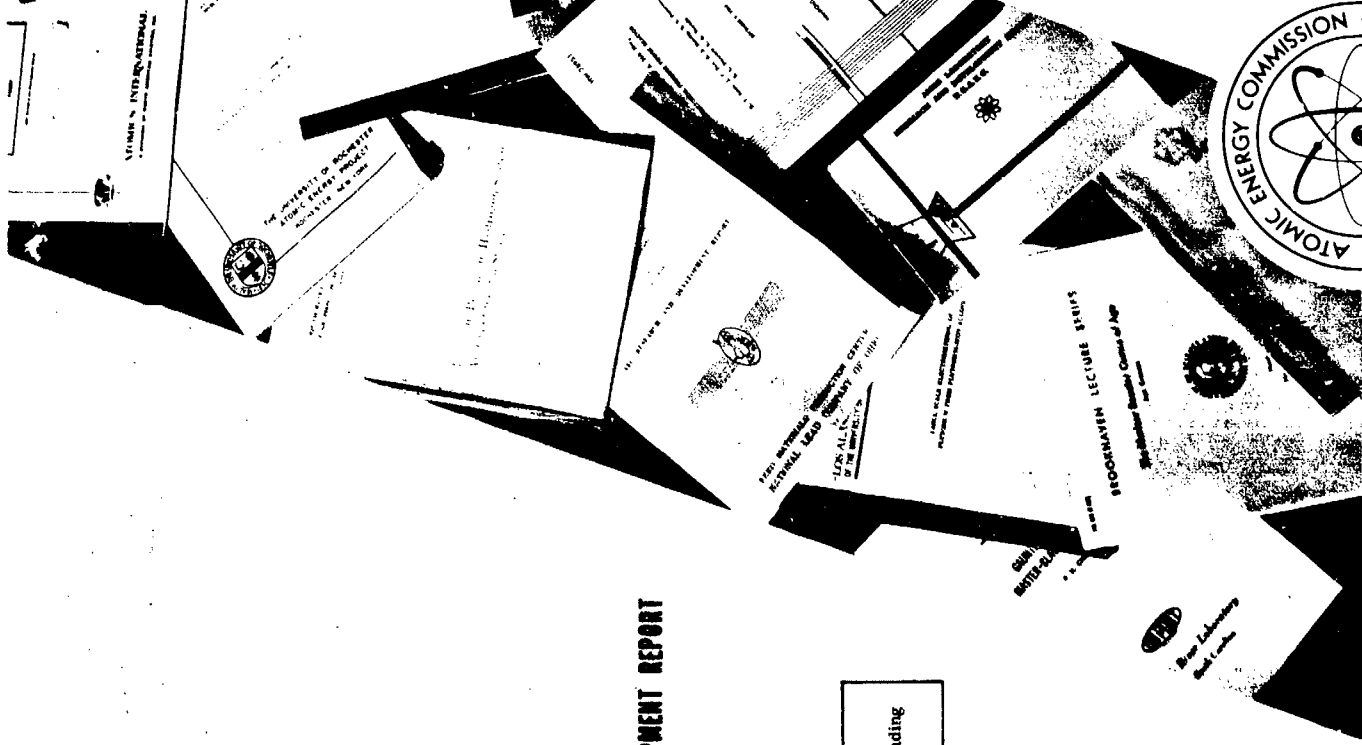
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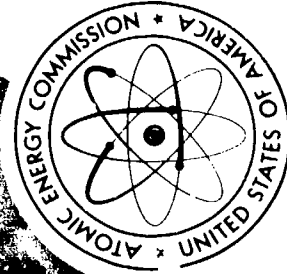
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## BUREAU OF SHIPS GROUP

### TECHNICAL INSPECTION REPORT



U.S.S. BARROW

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OPERATION CROSSROADS

DIRECTOR OF SHIP MATERIAL

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TECHNICAL INSPECTION REPORT

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By Authority of JOINT CHIEFS OF STAFF JCS 1786/58 DATED 18 APRIL 1949  
By *John H. Magallon, Lt. Col. USAF* MAY 16 1952

APPROVED:

F. X. Forest,  
Captain, U.S.N.

11 1946

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ATOMIC ENERGY ACT 1946

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USS BARROW (APA61)

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By *John H. Magallon, Lt. Col. USAF* MAY 16 1952

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# TECHNICAL INSPECTION REPORT

## OVERALL SUMMARY

### I. Target Condition After Test.

(a) Drafts after test, general areas of flooding, sources.

There was no flooding, hence no change in drafts or list.

(b) Structural damage.

#### HULL

The vessel suffered moderate blast damage to topside structure such as stacks and port side exposed bulkheads and doors.

Cargo hatch pontoons and boards were dislodged.

#### MACHINERY

No comment.

#### ELECTRICAL

Only structural damage which affected electrical equipment was the failure of the #1 cargo hold hatch covers. The falling hatch covers damaged special Bureau of Ships electrical test material in this hold.

(c) Other damage.

#### HULL

No comment.

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## MACHINERY

A few sections of small piping were broken. There was no other damage to machinery during Test A.

## ELECTRICAL

This vessel received only very slight electrical damage. Major items of damage were as follows:

1. Three cargo lights were damaged by air blast.
2. Two pelorus repeaters were knocked from their stands.
3. A brush on the port 24 inch searchlight was dislodged.
4. Approximately forty lamps were broken throughout the ship.
5. Insulation burned off two cables due to a fire on the deck above.
6. The standard compass binnacle was carried away.
7. One telephone hand-set was damaged.
8. The anemometer cups were carried away.

## II. Forces Evidenced and Effects Noted.

### (a) Heat.

## HULL

A flash heat emanated from an approximate bearing of 345 degrees relative and blistered paint on surfaces facing to port and forward. In addition, a fire was started in some manilla line on the after deck house.

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## MACHINERY

Paint on the exposed side of deck machinery was scorched and blistered.

## ELECTRICAL

Radiant heat on the port bow scorched the paint on top-side electrical equipment and cable. Since only the first layer of paint was burned, no electrical equipment was rendered inoperable.

### (b) Fires and explosions.

## HULL

A secondary fire occurred on the after deck house in exposed manilla line. This fire apparently was caused by ignition of the manilla line and possibly by ignition of some gasoline from a hand-billy pump. There is some evidence of a small explosion in the same area.

## MACHINERY

No evidence.

## ELECTRICAL

A small fire on top of the after deck house, port side, destroyed the insulation on one lighting and one fire control cable installed on the overhead of the compartment below.

### (c) Shock.

## HULL

A shock, of light intensity, caused breakage of a few rusted threaded joints in piping in various parts of the vessel.

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MACHINERY

None.

ELECTRICAL

The radiological effects and intense radiant heat are considered peculiar to the atom bomb. This vessel appeared to have received a sharper impact or shock than practically identical ships located ahead and astern of this vessel in the target array.

III. Results of Test on Target.

(a) Effect on machinery, electrical, and ship control.

HULL

No damage occurred to machinery or ship control. Electrical equipment, other than radio antennae, is undamaged.

MACHINERY

None. The slight damage to piping does not affect the overall operation of the machinery plant. This damage is all minor, does not affect any vital unit, and can be easily and quickly repaired by the ship's force.

ELECTRICAL

The effects on electrical equipment and ship's control were very slight. Except for the damage to two cargo lights, ammeter cups, standard compass binnacle, and one telephone, all electrical damage could have easily been repaired by the ship's force.

(b) Effect on gunnery and fire control.

HULL

No damage occurred to equipment. Personnel casualties from the blast wave might have occurred in exposed outside stations.

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MACHINERY

No evidence.

ELECTRICAL

There was evidence that the vessel may have received shock since approximately 40 lamps were broken and a searchlight ship ring brush was dislocated.

(d) Pressure

HULL

A blast wave struck the vessel from an approximate bearing of 30 degrees relative. The blast caused moderate damage to exposed structure facing to port and forward and dislodged cargo hatch battens and pontoons.

MACHINERY

Whipping motion of the vessel following the blast apparently broke a few sections of small piping. Blast pressure slightly dented the outer casings of both stacks.

ELECTRICAL

Air blast is considered to be responsible for most of the damage to electrical equipment on this vessel. The damage to cargo lights, telephone hand-set, pelorus repeaters, standard compass, and the wind intensity system is considered to be due to the air blast.

(e) Effects peculiar to the atom bomb.

HULL

Flash heat and pressure exerted over large areas is evident. No radiological hazards were found when the vessel was boarded on the day after the burst.

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MACHINERY

No comment.

ELECTRICAL

Except for the burning of one cable to a director, there was no effect electrically on gunnery or fire control. It is considered that if a crew had been aboard, the fire could have easily been controlled and the damage prevented.

(c) Effect on watertight integrity and stability.

HULL

None.

MACHINERY

No comment.

ELECTRICAL

None.

(d) Effect on personnel and habitability.

HULL

It is doubtful whether the blast or heat would have caused personnel casualties, except in exposed stations. Habitability is very slightly affected in that living spaces, adjacent to the cargo hatches, have to be made weather tight in case of inclement weather.

MACHINERY

None below decks.

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ELECTRICAL

It is estimated that there would have been casualties to exposed personnel due to the air blast and the radiant heat. Personnel in protected areas would not have been affected. The effects of radioactivity on personnel are not known. Habitability was not affected by this test.

(e) Effect on fighting efficiency.

HULL

The damage to radio antennae with the resulting effect on external communications and the possible personnel injuries from blast in exposed stations would have only a slight effect on the fighting efficiency of the vessel.

MACHINERY

None.

ELECTRICAL

The effect on the fighting efficiency of this vessel from an electrical standpoint was negligible. It is considered that the only reduction in fighting efficiency would have been from personnel casualties.

IV. Summary of Observers' Impressions and Conclusions.

HULL

Disregarding the effects of radioactivity, it appears that this vessel would be able to carry out its assigned mission. All damage repairs are either within the capacity of the ship's force or could be delayed until some future Navy Yard overhaul.

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## MACHINERY

The BARROW was outside the effective range of the explosion during Test A.

## ELECTRICAL

This vessel was too far from the center of the blast to receive significant material damage as a result of this test. It appears that at this distance the major consideration for the change in the design of naval vessels will be the protection of personnel.

## V. Preliminary Recommendations.

### HULL

Cargo hatch pontoons and boards should have more positive securing arrangements.

## MACHINERY

None.

## ELECTRICAL

It is recommended that the gimbal pins which hold pelorus repeaters be lengthened and threaded binnacle pins with locking nuts to be used. It is believed that a great deal of the damage to pelorus repeaters experienced by vessels in this test would be eliminated by such a change.

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## TECHNICAL INSPECTION REPORT

### SECTION I - HULL

#### GENERAL SUMMARY OF HULL DAMAGE

##### I. Target Condition After Test.

- (a) Drafts after test; list; general areas of flooding, sources.

There was no flooding, hence no change in drafts or list.

- (b) Structural damage.

The vessel suffered moderate blast damage to top-side structure such as stacks and port side exposed bulkheads and doors.

Cargo hatch pontoons and boards were dislodged.

- (c) Other damage.

No comment.

##### II. Forces Evidenced and Effects Noted.

- (a) Heat.

A flash heat emanated from an approximate bearing of 345 degrees relative and blistered paint on surfaces facing to port and forward. In addition, a fire was started in some manilla line on the after deck house.

- (b) Fires and explosions.

A secondary fire occurred on the after deck house in exposed manilla line. This fire apparently was caused by ignition of the manilla line and possibly by ignition of some gasoline from a handy-billy pump. There is some evidence of a small explosion in the same area.

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(c) Shock.

A shock, of light intensity, caused breakage of a few rusted threaded joints in piping in various parts of the vessel.

(d) Pressure.

A blast wave struck the vessel from an approximate bearing of 345 degrees relative. The blast caused moderate damage to exposed structure facing to port and forward and dislodged cargo hatch battens and pontoons.

(e) Effects peculiar to the Atomic Bomb.

Flash heat and pressure exerted over large areas is evident. No radiological hazards were found when the vessel was boarded on the day after the burst.

III. Results of Test on Target.

(a) Effect on machinery, electrical, and ship control.

No damage occurred to machinery or ship control. Electrical equipment, other than radio antennae, is undamaged.

(b) Effect on gunnery and fire control.

No damage occurred to equipment. Personnel casualties from the blast wave might have occurred in exposed topside stations.

(c) Effect on watertight integrity and stability.

None.

(d) Effect on personnel and habitability.

It is doubtful whether the blast or heat would have caused personnel casualties, except in exposed stations. Habit-

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ability is very slightly affected in that living spaces, adjacent to the cargo hatches, have to be made weather tight in case of inclement weather.

(e) Effect on fighting efficiency.

The damage to radio antennae with the resulting effect on external communications and the possible personnel injuries from blast in exposed stations would have only a slight effect on the fighting efficiency of the vessel.

IV. Summary of Observers Impressions and Conclusions.

Disregarding the effects of radioactivity, it appears that this vessel would be able to carry out its assigned mission. All damage repairs are either within the capacity of the ships force or could be delayed until some future Navy Yard overhaul.

V. Preliminary Recommendations.

Cargo hatch pontoons and boards should have more positive securing arrangements.

VI. Instructions for loading the vessel specified the following:

ITEM	LOADING
Fuel oil.	Full load.
Diesel oil.	Full load.
Ammunition.	100 percent.
Potable and reserve feed water.	Full load.
Salt water ballast.	None.

Details of the actual quantities of the various items aboard are included in Report 7, Stability Inspection Report, submitted by the ship's force in accordance with 'Instructions to Target Vessels for Test and Observations by Ship's Force' issued by the Director of Ships Material. This report is available for inspection in the Bureau of Ships Crossroads Files.

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## DETAILED DESCRIPTION OF HULL DAMAGE

### A. General Description of Hull Damage.

#### (a) Overall condition of vessel.

Blast and flash heat apparently came from forward on the port side. The vessel suffered moderate blast damage to topside structure, to the port shell plating between frames 36 and 45, and to the upper deck plating between the hatch coaming and the port side at frame 42.

A fire occurred on the after deck house.

General views of the exterior are shown on pages 43 to 58 inclusive.

#### (b) General areas of hull damage.

The general areas of hull damage are topside light structures, the after deck house, the port main deck weather passage-way and the cargo hatches.

#### (c) Apparent causes of hull damage in each area.

Damage to structure is primarily attributable to blast pressure except where the fire occurred. The fire apparently started by ignition of manilla line and possibly by ignition of some gasoline from a handy-billy pump.

#### (d) Principal areas of flooding with sources.

No flooding occurred.

#### (e) Residual strength, buoyancy, and effect of general condition of hull on operability.

The residual strength and buoyancy are not affected. Operability is only affected by the damage to antennae.

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### B. Superstructure (Exclusive of Gun Mounts).

#### (a) Description of damage.

On the signal bridge level, the starboard flag bag is demolished and the ladder to the starboard searchlight platform on the forward stack is distorted. (Photo. 1913-2, page 59). The port flag bag is slightly crushed and the ladder is intact (Photo. 1913-3, page 60). The starboard signal halyards are burned, but the port halyards are undamaged. The stacks are in good condition except for slight dishing on the port sides. (Photo. 1913-3, page 60). The master compass wooden pedestal has been separated from its base and thrown to starboard (Photo. 1913-4, page 61). A gyro repeater on the signal bridge was jarred out of its gimbals. The signal bridge plating is very uneven forward, but this condition is believed to have existed before the test.

On the navigating bridge level, port, the companion-way door, 03-91-6, is dished and inoperable. The port bulkhead of the radio room is also slightly dished. A gyro repeater on the starboard wing of the bridge was jarred out of its gimbals.

On the superstructure deck level, port, doors to the captains cabin, to the deck locker B-0208A, and to the boatswain gear locker are dished. The port bulkhead of the captains cabin is dished inboard at a point three feet aft of the damaged door.

On the after deck house top, a sheet metal cover has been blown off a fog generator motor. The forward bulkhead of the after deck house is slightly dished from side to side. The double door to the carpenter shop, frame 130, port, is severely distorted and the door frame is dished (Photo. 1824-2, page 62).

Antennae insulators are fractured and antennae wires are down, both forward and aft.

All canvas on the port side, including fun covers, was burned or blown off.

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Paint is blistered over superstructure surfaces exposed to the blast.

(b) Causes of damage in each area.

Structural damage is attributable to blast pressure. Blistered paint and a fire on the after deck house are attributable to flash heat.

(c) Evidences of fire in the superstructure.

There was a secondary fire on top of the after deck house which apparently was caused by ignition of manila line and possibly of some gasoline from a handy-billy pump. There is some evidence of a small explosion in the same area. This fire caused grounds in armored wire in the carpenter shop below, where the insulation was burned.

(d) Estimate of relative effectiveness against heat and blast.

Light metal of five pound weight or less is vulnerable at the range that this vessel was from the burst.

(e) Constructive criticism of superstructure design or construction, including important fittings and equipment.

Cargo hatch covers should be made more resistant to displacement by shock, blast, or extreme rolling of the vessel. Sheetmetal should not be used on topside where it is very vulnerable to blast pressures.

C. Turrets, Guns and Directors.

No damage.

D. Torpedo Mounts, Depth Charge Gear.

Not applicable.

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E. Weather Deck.

(a) General condition of deck and causes of damage.

The upper deck plating to port of the forward cargo hatch coaming is bulged slightly upward at frame 42.

In the port main deck weather passageway, the two doors in bulkhead 122 are severely dished. They are jammed and inoperable. (Photo 1913-7, page 63). The entire length of the port longitudinal bulkhead is lightly dished and has areas of blistered paint. In the area of frame 119 to 122, dishing of the bulkhead is a maximum of two inches. All doors and door frames are slightly dished except for two quick acting doors. No damage or burned paint occurred in the starboard passageway.

(b) Usability of deck in damaged condition.

The deck is entirely usable. A few minor lightweight articles require replacement in their normal stowages. (Photo 1923-12, page 64).

(c) Condition of equipment and fittings.

Life raft supports on the port side are slightly damaged. (Photo 1824-3, page 65). Other equipment is undamaged.

F. Exterior Hull (Above Waterline).

(a) Condition of exterior hull plating and causes of damage.

The port shell is dished a maximum of three inches between frames 36 and 45 and between the sheer strake and the second deck. This may be due to blast pressure but more probably it is due to a tug coming alongside. (Photo 1913-12, page 66). Bulkhead 40 is buckled at the port shell in way of this damage. (Photo 1913-10, page 67).

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Wrinkling and local dents in the port shell between frames 110 and 120 and between frames 130 and 165, have been identified as previous damage.

Paint is burnt along nearly the entire port side shell plating.

(b) Condition of exterior hull fittings and causes of damage.

No damage.

(c) Details of any impairment of sheer strakes.

No impairment of the sheer strakes occurred.

(d) Condition of side armor belt.

Not applicable.

G. Interior Compartments (Above Waterline).

(a) Damage to structure and causes.

Bulkhead 40 is severely buckled at the port shell between the main and second decks. Forward and aft of bulkhead 40 for about five frames, the port shell frames and brackets are distorted. This damage may have been caused by blast pressure on the exterior of the shell plating but it is more probable that the damage was caused by a tug coming alongside.

Deck deflection gages installed at frame 48, port and starboard, on the main deck, recorded a two and three inch compression although no evidence of structural working could be found. Deck deflection gage readings are on page 75.

(b) Damage to joinder bulkheads and causes.

No damage.

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(c) Details of damage to access closures and fittings.

Forward cargo hatch upper deck boards are dished, disarranged, and dislodged. Some have fallen to the main deck and others to the hold. (Photo 1823-9, page 68). Two main deck and two second deck hatch boards have been blown or fallen into the hold. (Photo 1913-8, page 69). Two of the covers landed on a diesel generator unit mounted in the hold and damaged the generator casing. (Photos 1913-11 and 9, pages 70, and 71). No other damage occurred to structure in this vicinity although a deck deflection gage installed at the midpoint of the starboard hatch girder is severely buckled and its welded connection to the second deck is cracked. No permanent set of the girder or main deck is detectable.

After cargo hatch upper deck boards are dished, disarranged, and some have fallen into the hold. Twenty-one of these landed on the port side of the hold. The three central, main deck, covers demolished a plane stowed in the hold. (Photos 1913-5 and 6, pages 72, and 73).

(d) Condition of equipment within compartments.

Many pipe berths on the main deck, to starboard of the forward hold, have been thrown out of the stanchion hooks.

(e) Evidence of fire.

No fire occurred in the interior.

(f) Damage in way of piping, cables, ventilation ducts, etc.

Five breaks occurred in one inch flushing lines at rusted threaded joints in the forward and after part of the ship.

(g) Estimate of reduction in watertight subdivision, habitability and utility of compartments.

Watertight subdivision is unimpaired. Habitability

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and utility is temporarily slightly affected by arrangement of berths on the main deck to starboard of the inboard cargo hatch.

H. Armor Decks.

Not applicable.

I. Interior Compartments (Below Waterline).

No damage.

J. Underwater Hull

No damage.

K. Tanks.

No damage or contamination of liquids occurred.

L. Flooding.

No flooding occurred.

M. Ventilation (Exclusive of Blowers).

No damage.

N. Ship Control

(a) Damage to ship control stations and causes.

Ship control is slightly affected by the damage to the master magnetic compass, and by the damage to various antennae.

(b) Constructive criticism.

No comment.

O. Fire Control

No damage.

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P. Ammunition Behavior.

Normal.

Q. Ammunition Handling.

Ammunition handling equipment is undamaged.

R. Strength.

(a) Permanent hog or sag.

There is no evidence of a permanent hog or sag in the ship.

(b) Shear strains in hull plating.

There are no evidences of shear strains in the hull plating.

(c) Evidence of transverse or racking strains.

There are no evidences of transverse or racking strains.

(d) Details of any local failures in way of structural discontinuities.

No failures.

(e) Evidence of panel deflection under blast.

The forward bulkhead of the after deck house is slightly dished across its entire width.

(f) Turret, machinery, and gun foundations.

No damage.

S. Miscellaneous.

No comment.

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TECHNICAL INSPECTION REPORT

SECTION II - MACHINERY

GENERAL SUMMARY OF MACHINERY DAMAGE

I. Target Condition after Test.

(a) Drafts after test; list; general areas of flooding, sources.

No data taken by machinery group.

(b) Structural damage.

No comment.

(c) Other damage.

A few sections of small piping were broken. There was no other damage to machinery during Test A.

II. Forces Evidenced and Effects Noted.

(a) Heat.

Paint on the exposed side of deck machinery was scorched and blistered.

(b) Fires and explosions.

No evidence.

(c) Shock.

No evidence.

(d) Pressure.

Whipping motion of the vessel following the blast

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apparently broke a few sections of small piping. Blast pressure slightly dented the outer casings of both decks.

(e) Effects apparently peculiar to the atom bomb.

None.

### III. Effects of Damage.

(a) Effect on machinery and ship control.

None. The slight damage to piping does not affect the overall operation of the machinery plant. This damage is all minor, does not affect any vital unit, and can be easily and quickly repaired by the ship's force.

(b) Effect on gunnery and fire control.

No comment.

(c) Effect on water-tight integrity and stability.

No comment.

(d) Effect on personnel and habitability.

None below decks.

(e) Total effect on fighting efficiency.

None.

### IV. General Summary.

The BARROW was outside the effective range of the explosion during Test A.

### V. Preliminary Recommendations.

None.

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## DETAILED DESCRIPTION OF MACHINERY DAMAGE

### A; General Description of Machinery Damage.

(a) Overall Condition.

A few pieces of small piping were broken. There was no other damage to any part of the machinery installation.

(b) Areas of major damage.

None.

(c) Primary cause of damage in each area of major damage.

Not applicable.

(d) Effect of target test on overall operation of machinery plant.

The test had no effect on the operation of the machinery plant. The piping broken during the test does not impair operation of the ship and can be easily repaired by the ship's force.

### B. Boilers.

1. Undamaged. Both boilers have been steamed since Test A. Performance is normal.

2. Hydrostatic tests on #1 boiler before and after Test A, indicate no difference in the tightness of the boiler.

3. Outer casings of both stacks are slightly dented but inner casings are undamaged. This does not impair operation or affect the stacks structurally.

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# HYDROSTATIC TEST ON BOILER #1

	Before Test A	After Test A
Initial pressure	585 lb/sq. in.	585 lb/sq. in.

Time required for pressure to drop to 100 lb/sq. in.	30 minutes	1 hour
--	------------	--------

Time required for pressure to drop to 0	5 hours	3-1/2 hours
---	---------	-------------

## C. Blowers.

Undamaged. The two after blowers have been in operation since Test A. The two forward blowers were tested under service conditions after the test. Operation of all blowers is normal.

## D. Fuel Oil Equipment.

Undamaged. All fuel oil equipment has been tested and no defects were found.

## E. Boiler Feedwater Equipment.

Undamaged. All feedwater equipment has been tested and no defects were found.

## F. Main Propulsion Machinery.

Undamaged. Both turbines for the main propulsion generators were operated for one hour at no load and 1000 RPM. The shafts were turned over in both directions for a few minutes with turbines operating at light load. Performance was normal.

## G. Reduction Gears.

Not Applicable.

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## H. Shafting and Bearings.

Undamaged. All shafting was jacked over and then turned by motors. No defects were found. Stern tubes, packing glands and bearings were inspected and found undamaged.

## I. Lubrication System.

Undamaged. The lubrication system has been operated under service conditions since Test A, and functioned normally.

## J. Condensers and Air Ejectors.

Undamaged. Both main condensers have been operated at 29-1/2 inches vacuum. The auxiliary condensers have been operated at 27-1/2 inches. Performance was normal.

## K. Pumps.

Undamaged. All pumps have been operated under service conditions.

## L. Auxiliary Generators (Turbines and Gears).

Undamaged. All turbo-generators have been operated under service conditions for at least 2 hours since Test A. Performance was normal.

## M. Propellers.

Undamaged. The propellers were inspected and turned over. No defects were found.

## N. Distilling Plant.

Undamaged. Evaporators were placed in operation immediately after Test A. Performance was normal.

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O. Refrigeration Plant.

Undamaged. The refrigerating plant was placed in operation immediately after Test A. Performance was normal.

P. Winches, Windlasses, and Capstans.

Undamaged. All deck machinery has been tested and operated normally.

Q. Steering Engine.

Undamaged. Both units were tested from all stations after Test A.

R. Elevators, Ammunition Hoists, Etc..

Undamaged. The gasoline hoist and the two ammunition hoists were tested after Test A, and operated normally.

S. Ventilation (Machinery).

Undamaged. All ventilation machinery has been operated since Test A, and functions normally.

T. Compressed Air Plant.

Undamaged. The air compressors have been operated under service conditions since Test A, and function normally.

U. Diesels (Generators and Coats).

1. Undamaged.

2. No. 2 diesel fire pump was run at 80 lbs. discharge pressure for four hours and No. 1 diesel fire pump was run at 80 lbs. discharge pressure for 1/2 hour. Operation was normal.

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3. The emergency diesel generator was operated for 18 hours after the crew reboarded the ship. The salt water cooling pump motor burned out after the generator was in operation 12 hours. Otherwise, no defects were found. It is believed that the pump motor burned out due to moisture, which accumulated due to lack of ventilation in the compartment, and not from the effect of Test A.

V. Piping Systems.

1. The 1-1/2 inch salt water cooling line for refrigeration condensers, the drain line on first effect of #2 evaporator, a 1 inch vent line on #1 evaporator air ejector, four 1 inch iron pipes in the flushing system, and one 1 inch line in galley broke off during the blast. These pipes were all badly corroded before the test.

2. All other piping was tested and found in good condition.

W. Miscellaneous.

1. Undamaged.

2. All laundry, galley, and machinery shop equipment has been operated under service conditions since Test A, and functioned normally.

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## TECHNICAL INSPECTION REPORT

### SECTION III - ELECTRICAL

#### GENERAL SUMMARY OF ELECTRICAL DAMAGE

##### I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

There was no flooding. Drafts and list were not observed.

##### (b) Structural damage.

Only structural damage which affected electrical equipment was the failure of the #1 cargo hold hatch covers. The falling hatch covers damaged special Bureau of Ships Electrical test material in this hold.

##### (c) Damage.

This vessel received only very slight electrical damage. Major items of damage were as follows:

1. Three cargo lights were damaged by air blast.
2. Two pelorus repeaters were knocked from their stands.
3. A brush on the port 24 inch searchlight was dislodged.
4. Approximately forty lamps were broken throughout the ship.
5. Insulation burned off two cables due to a fire on the deck above.
6. The standard compass binnacle was carried away

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7. One telephone hand-set was damaged.

8. The anemometer cups were carried away.

## II. Forces Evidenced and Effects Noted.

### (a) Heat.

Radiant heat on the port bow scorched the paint on topside electrical equipment and cable. Since only the first layer of paint was burned, no electrical equipment was rendered inoperable.

### (b) Fires and Explosions.

A small fire on top of the after deck house, port side, destroyed the insulation on one lighting and one fire control cable installed on the overhead of the compartment below.

### (c) Shock.

There was evidence that the vessel may have received shock since approximately 40 lamps were broken and a searchlight slip ring brush was dislocated.

### (d) Pressure.

Air blast is considered to be responsible for most of the damage to electrical equipment on this vessel. The damage to cargo lights, telephone hand-set, pelorus repeaters, standard compass, and the wind intensity system is considered to be due to the air blast.

### (e) Any effects apparently peculiar to the Atom Bomb.

The radiological effects and intense radiant heat are considered peculiar to the Atomic Bomb. This vessel appeared to have received a sharper impact or shock than practically identical ships located ahead and astern of this vessel in the target array.

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## III. Effects of Damage.

### (a) Effect on electrical equipment and ship control.

The effects on electrical equipment and ship's control were very slight. Except for the damage to two cargo lights, anemometer cups, standard compass binnacle, and one telephone, all electrical damage could have easily been repaired by the ship's force.

### (b) Effect on gunnery and fire control.

Except for the burning of one cable to a director, there was no effect electrically on gunnery or fire control. It is considered that if a crew had been aboard, the fire would have easily been controlled and the damage prevented.

### (c) Effect on watertight integrity and stability.

None.

### (d) Effect on personnel and habitability.

It is estimated that there would have been casualties to exposed personnel due to the air blast and the radiant heat. Personnel in exposed areas would not have been affected. The effects of radioactivity on personnel are not known. Habitability was not affected.

### (e) Total effect on fighting efficiency.

The effect on fighting efficiency of this vessel from an electrical standpoint was negligible. It is considered that the only reduction in fighting efficiency would have been from personnel casualties.

## IV. General Summary of Observers' Impressions and Conclusions.

This vessel was too far from the center of the blast to receive significant material damage as a result of this test. It appears

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ears that at this distance the major consideration for the change in the design of naval vessels will be the protection of personnel.

#### V. Any Preliminary General or Specific Recommendations of the Inspecting Group.

It is recommended that the gimbals pins which hold pelorus repeaters be lengthened and threaded binnacle pins with locking nuts be used. It is believed that a great deal of the damage to pelorus repeaters experienced by vessels in this test could be eliminated by such a change.

### SECTION III

#### PART C - INSPECTION REPORT

##### SECTION C - ELECTRICAL

###### A. General Description of Electrical Damage.

###### (a) Overall condition.

The electrical damage of this vessel as a result of test A. was slight. Items of damage were as follows:

1. Three cargo lights were damaged by air blast.
2. Two pelorus repeaters were knocked from their stands.
3. A brush was dislodged on the port 24 inch searchlight.
4. Approximately forty (40) lamps were broken throughout the ship.
5. Special Bureau of Ships, code 880, test material located in the forward cargo hold was damaged by falling hatch covers.
6. Two cables had their insulation burned off.
7. Overload relays in three davit controllers tripped out apparently due to shock.
8. Standard compass binnacle at secondary control was knocked down by air blast.
9. Two telephone cabinets were slightly damaged by air blast.
10. Portable Beachmaster announcing system was slightly damaged by air blast.
11. Anemometer cups were carried away.
12. The rudder angle indicator at the secondary control station had a cracked dial window.

###### (b) Areas of major damage.

The areas of major damage were exposed locations topside, around the cargo holds and just inside weather doors.

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(c) Primary causes of damage in each area of major damage

The primary cause of damage to this vessel was air

blast.

(d) The effects of the target test on the overall operation of the electric plant.

1. The ship's service generator plant was undamaged by the test. All equipment was operable.
2. All engine and boiler auxiliaries were undamaged.
3. Electric propulsion was not damaged by the test.
4. Communication equipment was all operable except one 24 inch searchlight, one sound powered telephone and the portable beechmaster announcing unit (PAB). The searchlight was not seriously damaged and was repaired by the ship's force within a few minutes.
5. All fire control circuits were operable except for one cable to director on 02 deck at frame 128 port side, which was destroyed by fire.
6. All electrical ventilation equipment was undamaged.
7. Except for the breaking of approximately 40 lamps and the damage to three cargo lights, all lighting equipment was operable. There were spares available for the lamps that were broken.

(e) Types of equipment most affected.

Lighting equipment was the most affected.

B. Electric Propulsion Rotating Equipment (S41).

No damage.

C. Electric Propulsion Control Equipment (S41)

No damage.

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D. Ship's Service Generators (S61).

(a) There was no damage to the normal ship's service generators.

(b) The special Bureau of Ships, code 880, 300 KW, 120/240 volt D.C., Diesel Generator, Item 10E19, installed in the forward cargo hold was struck by falling hatch covers. See photographs 1913-9, 1913-11, pages 70 and 71. One brush inspection plate was bent down until it rested on the brush rigging, however, there appeared to be no damage to the brush rigging or commutator. It is believed that the generator end of the set would be operable if the inspection plate was removed, however, the engine would require considerable repair.

(c) The special Bureau of Ships, Code 880, 80KW, 120/240 volt D.C. Diesel Generator Set, Item 10E18, installed in the forward cargo hold was struck by falling hatch covers. The engine generator sub-base evidently received most of the impact. Five of the six 5/8 holding down bolts were sheared. The forward part of the base bent approximately 6 inches out of true indicating that the middle bolts held longer than the front bolts. One stud type terminal was knocked off the engine cranking motor. The generator end of the set appeared to be undamaged.

E. Emergency Generators (S61).

No damage.

F. Switchboards, Distribution and Transfer Panels. (S62).

No damage.

G. Wiring, Wiring Equipment and Wireways (S62).

(a) One lighting and one fire control cable located at frame 128 port on the 01 deck in the boat repair shop had their insulation destroyed due to a fire on the 02 deck immediately above the cables. The cables require replacing to operate the equipment. It is considered that temporary cables could have been run by the ship's force to permit operation of the equipment supplied by these cables.

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(b) Exposed cable located on masts and superstructure was slightly scorched by radiant heat. This scorching was only on the outer layer of paint so no electrical damage resulted.

(c) There was no damage to wiring equipment or wireways.

H. Transformers (S82).

No damage.

I. Submarine Propelling Batteries (S82).

Not applicable.

J. Portable Batteries.

No damage.

K. Motors, Motor Generator Sets and Motor Controllers.

(a) The Special Bureau of Ships, code 680, 300 ampere gasoline engine driven welder, Item 10E14, located in the forward hold had its enclosure slightly dented at the generator end by falling hatch covers. The generator, which was inside the light metal enclosure, was undamaged and the entire unit appeared to be operable.

(b) It was necessary to reset the overload relays for 3 boat davit controllers before these controllers would operate. These overload relays are of the commercial low shock type and it is considered that they opened due to the shock that the vessel received.

L. Lighting Equipment (S84).

(a) The cargo lights were damaged by the air blast as follows:

1. One located at frame 58, starboard side of the 02 deck, had its frame twisted but was still operable.

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2. One located at frame 128, starboard side on 40MM director shield, had its frame twisted and its supply cable broken.

3. One located at frame 128, port side on 40MM director shield, had its frame twisted, glass broken and was not operable.

(b) The blue steamtight globe and lamp for the recognition light located on the port side of the foremast were broken by the air blast.

(c) The lamp for the forward anchor light was broken. However, its steamtight globe was intact.

(d) Approximately 15-100 watt and 20-50 watt rough service lamps were broken apparently due to shock, throughout the vessel. Most of them were located on the port side above the main deck.

M. Searchlights (S86).

The port 24 inch searchlight, Navy model 93013 was inoperative due to a slip ring brush jarring out of its holder. When the brush was replaced in its holder by the ship's crew, the searchlight operated satisfactorily.

N. Degaussing Equipment (S81).

The standard compass binnacle located at the secondary control station was carried away by the blast. See photograph 1913-4, page 81. Degaussing compensating coils and control box appeared undamaged although they were not tested since the cable had parted.

O. Gyro-Compass Equipment (S24).

(a) Two Sperry pelorus, one located at frame 60, centerline of 04 deck, and one located at frame 60, starboard side of 03 deck, had their repeaters blown free of the gimbal rings. No damage to the repeaters, pins or rings resulted for the repeaters operated

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satisfactorily when replaced on their stands. The air blast evidently temporarily distorted the gimbal rings and allowed the pins to release the repeater.

#### Recommendation.

It is recommended that the gimbal pins which hold the repeaters be lengthened and threaded binnacle pins with locking nuts be used. It is believed that such a change will eliminate a great deal of the damage to gyro equipment as experienced on the vessels in this test.

(b) The dead reckoning tracer located at frame 65, starboard side of the O3 deck, had the glass top broken. It is believed that this damage was due to loose gear sitting on top of the unit being lifted up and then impacting down. The unit was still operable.

#### P. Sound Powered Telephones (S65).

(a) A pressed steel hand-set cabinet located exposed at frame 61, port side of the O4 deck, had its door blown open allowing the hand-set to dislodge from its bracket and strike the bulkhead. The hand-set transmitter was missing. There was a slight dent in the cabinet indicating that the cabinet was struck by a missile, however, there was no evidence of what constituted the missile. It is believed that the cabinet was not properly latched but that the door was slightly open prior to the test.

(b) A four section head-set stowage cabinet located exposed at frame 60, centerline of the O4 deck was hanging by one of its four mounting tack welds. The other three welds were broken, evidently due to the air blast.

#### Q. Ship's Service Telephones (S65).

Not applicable.

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#### R. Announcing Systems (S65).

(a) The portable Beachmaster (PAB) announcing system located exposed at frame 60, centerline of the O4 deck, received the following damage due to air blast.

1. The speaker tripod was bent.
2. Two 836 tubes in the amplifiers were loose from their sockets.
3. The microphone was missing from its breast plate.

(b) The Webster model NT101 shock mounted intercommunication unit located exposed at frame 61, centerline of the O4 deck, had two of its four cast iron mounting feet broken off due to the air blast. Rust at the breaks indicate that both feet were cracked at least halfway through prior to the test.

#### S. Telegraphs (S65).

No damage.

#### T. Indicating Systems (S65).

(a) The anemometer cups were carried away by the air blast.

(b) The rudder angle indicator located at the secondary control station had its dial window cracked due to air blast. The dial was still readable and the unit was operable.

#### U. I.C. and A.C.O. Switchboards (S65).

No damage.

#### V. F.C. Switchboards (S71).

No damage.

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SECTION IV

PHOTOGRAPHS

TEST ABLE

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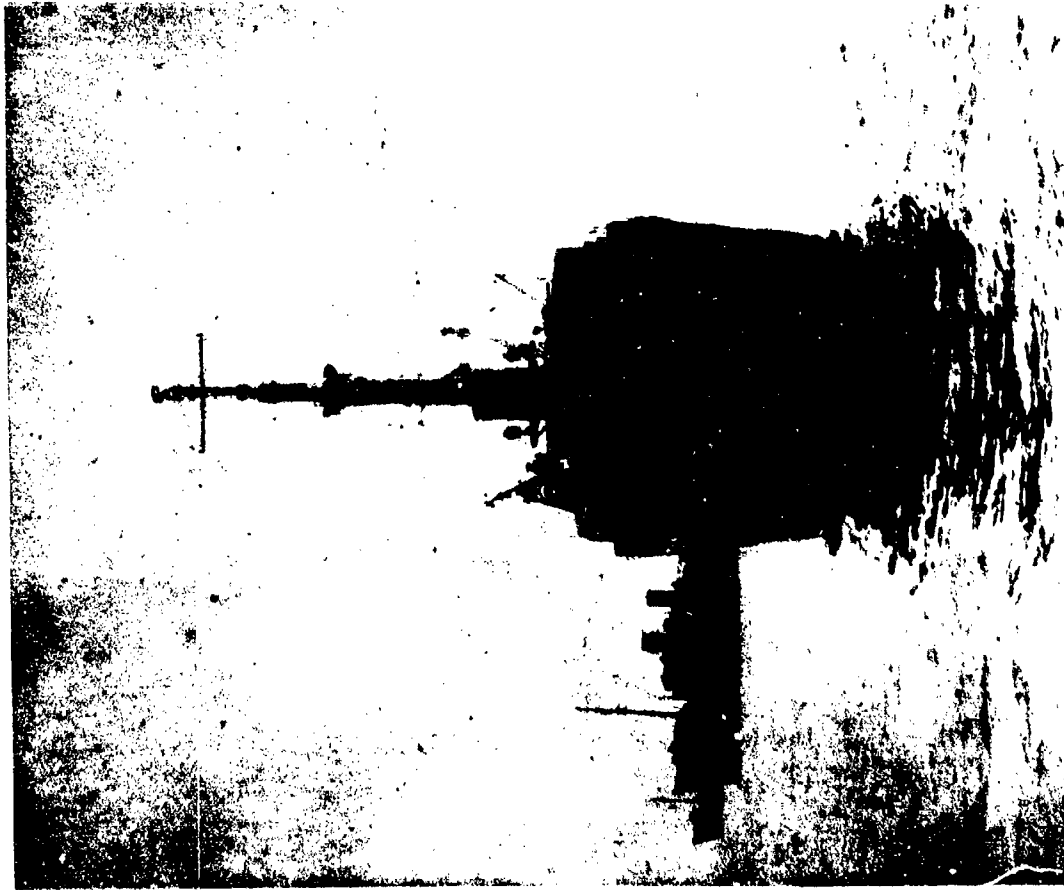
BA-CR-198-157-3. View from dead ahead before Test A.

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AA-CR-227-49-126. View from dead ahead after Test A.

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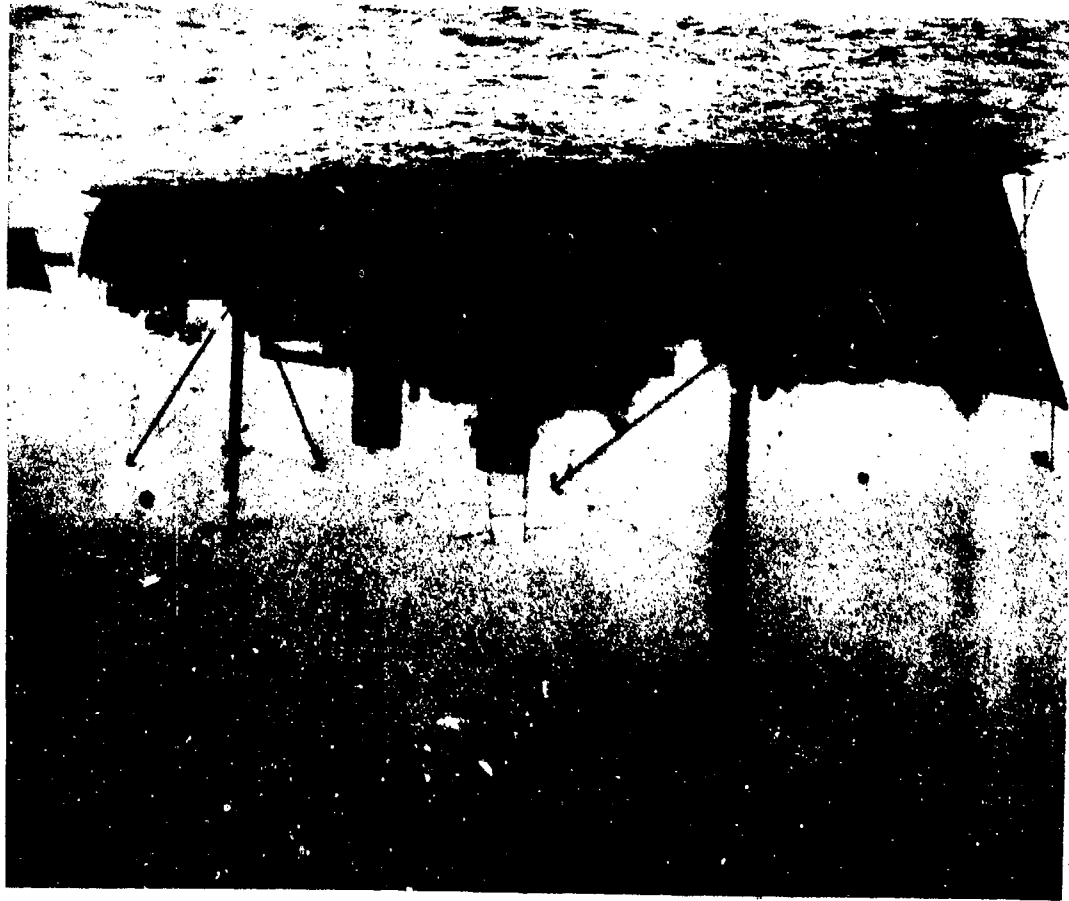
BA-CR-196-157-2. View from off port bow before Test A.

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AA-CR-227-49-127. View from off port bow after Test A.

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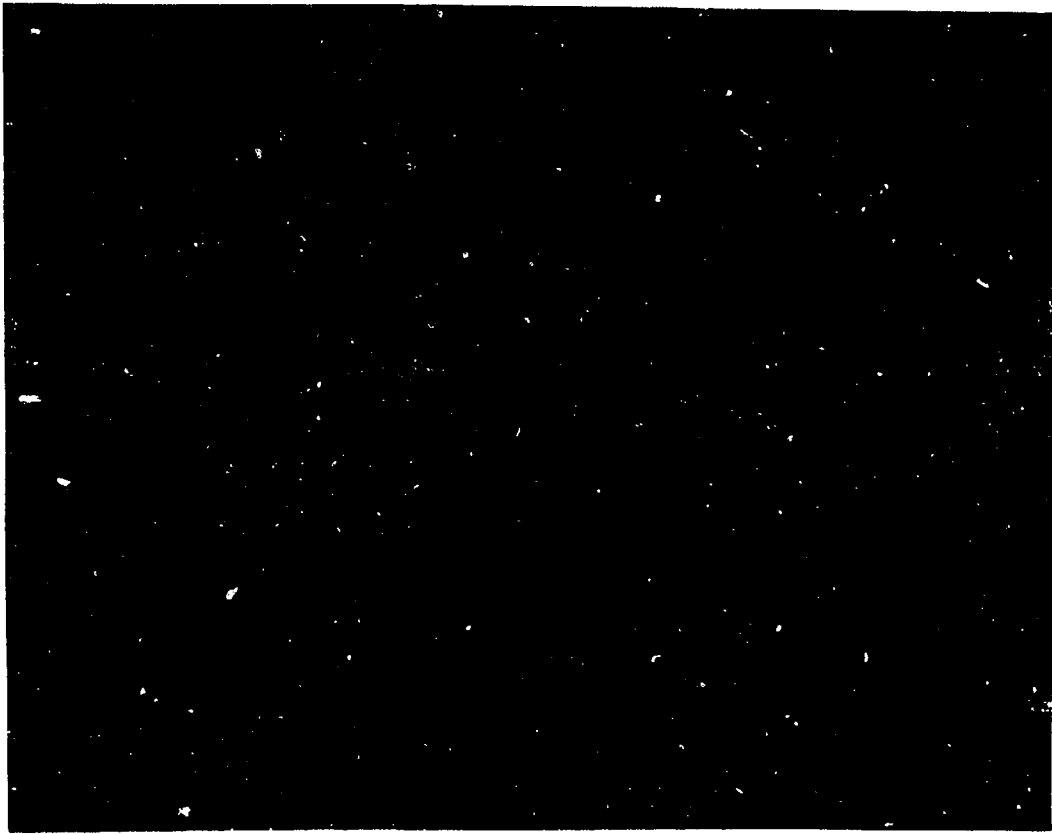
BA-CR-196-157-1. View from off port beam before Test A.

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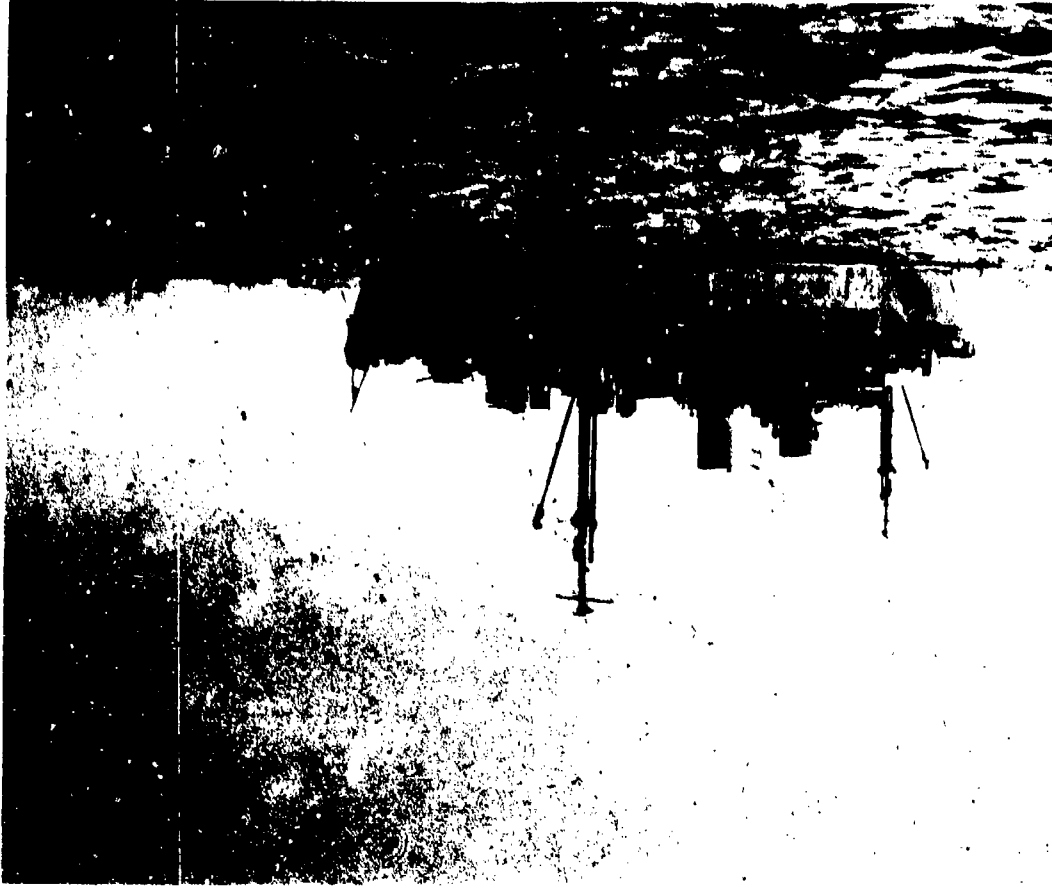
AA-CR-227-49-121. View from off port beam after Test A.

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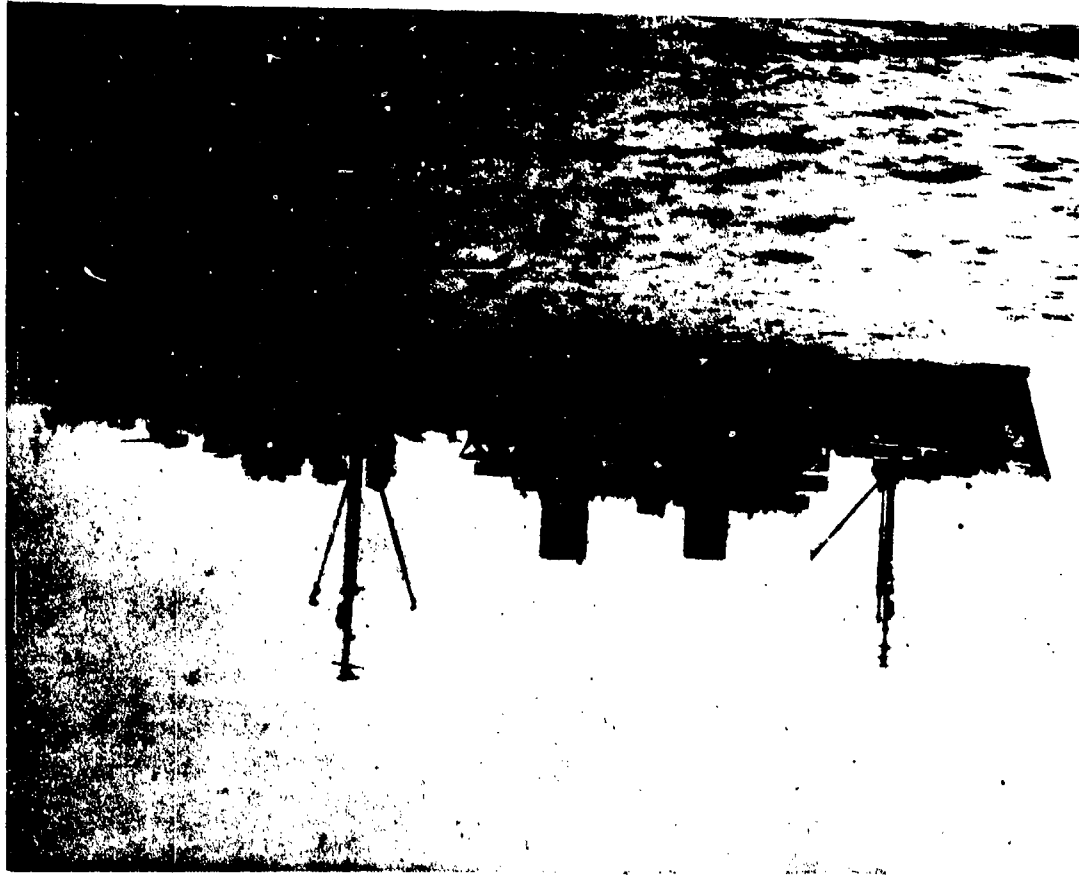
BA-CR-196-157-8. View from off port quarter before Test A.

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AA-CR-227-49-128. View from off port quarter after Test A.

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BA-CR-198-157-7. View from dead astern before Test A.

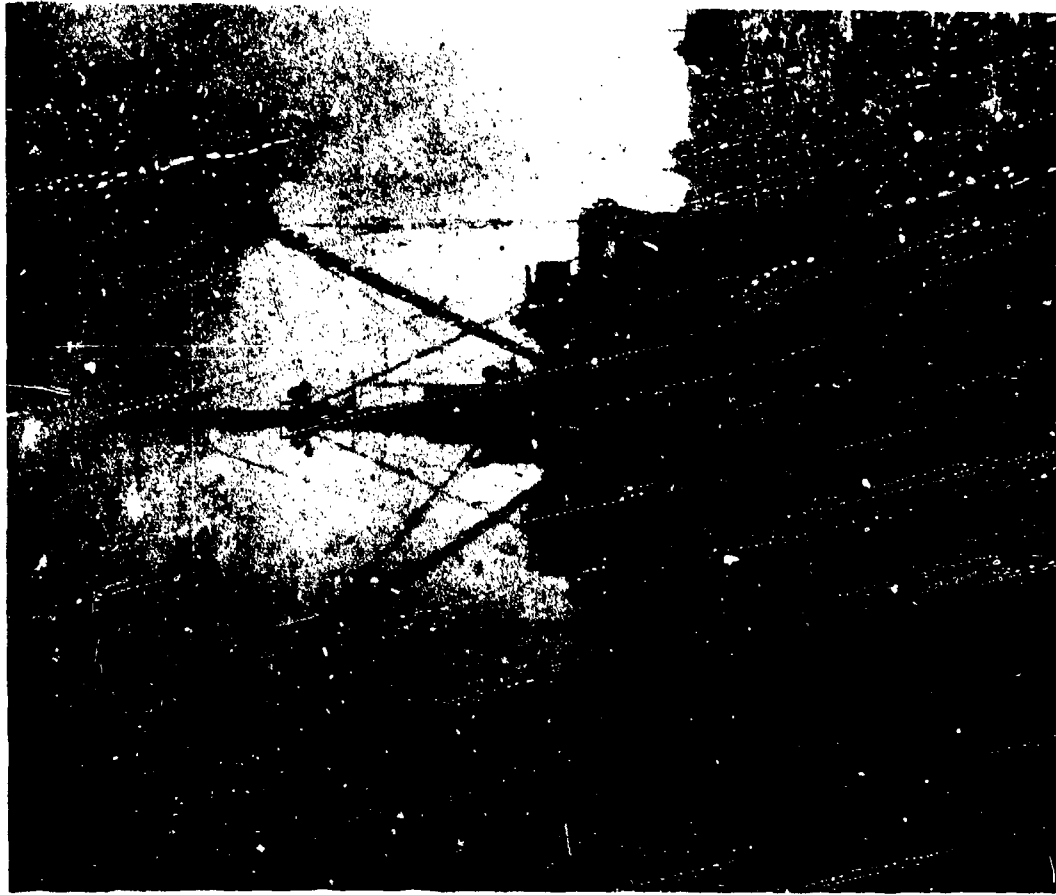
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AA-CR-227-49-123. View from dead astern after Test A.

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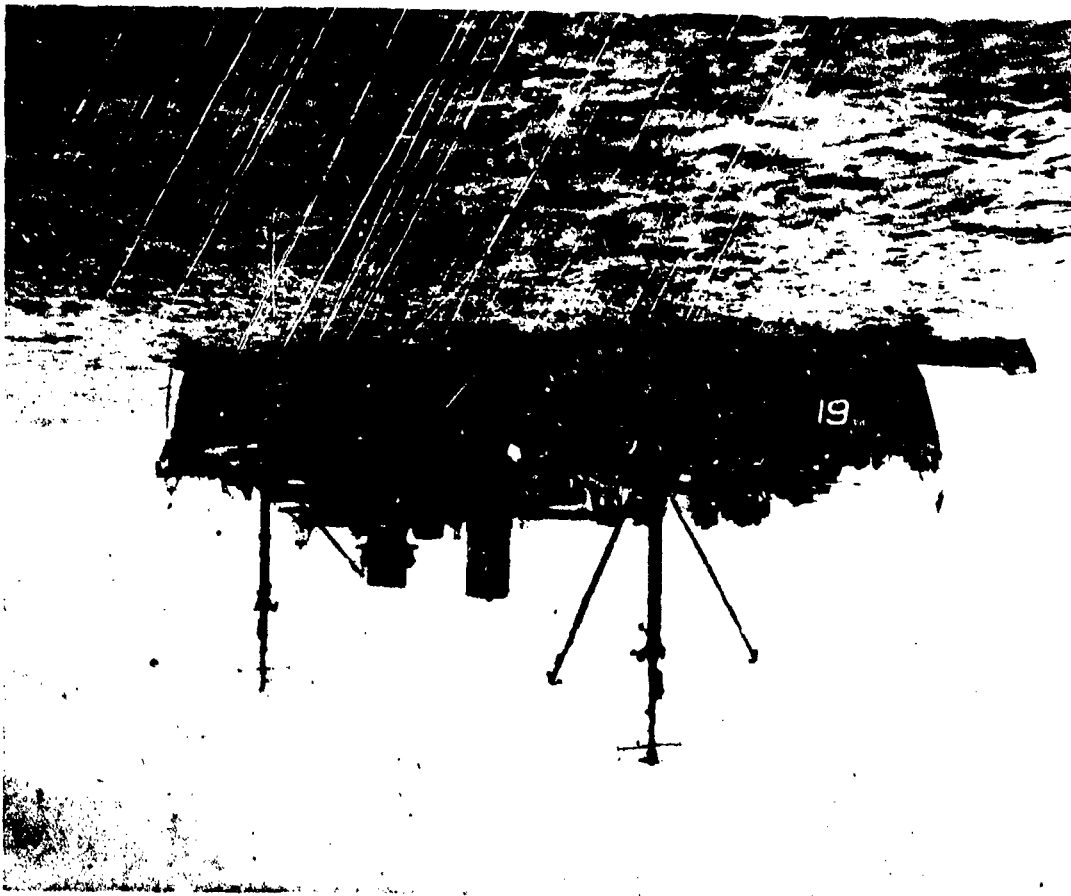
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BA-CR-196-157-8. View from off starboard quarter before Test A.

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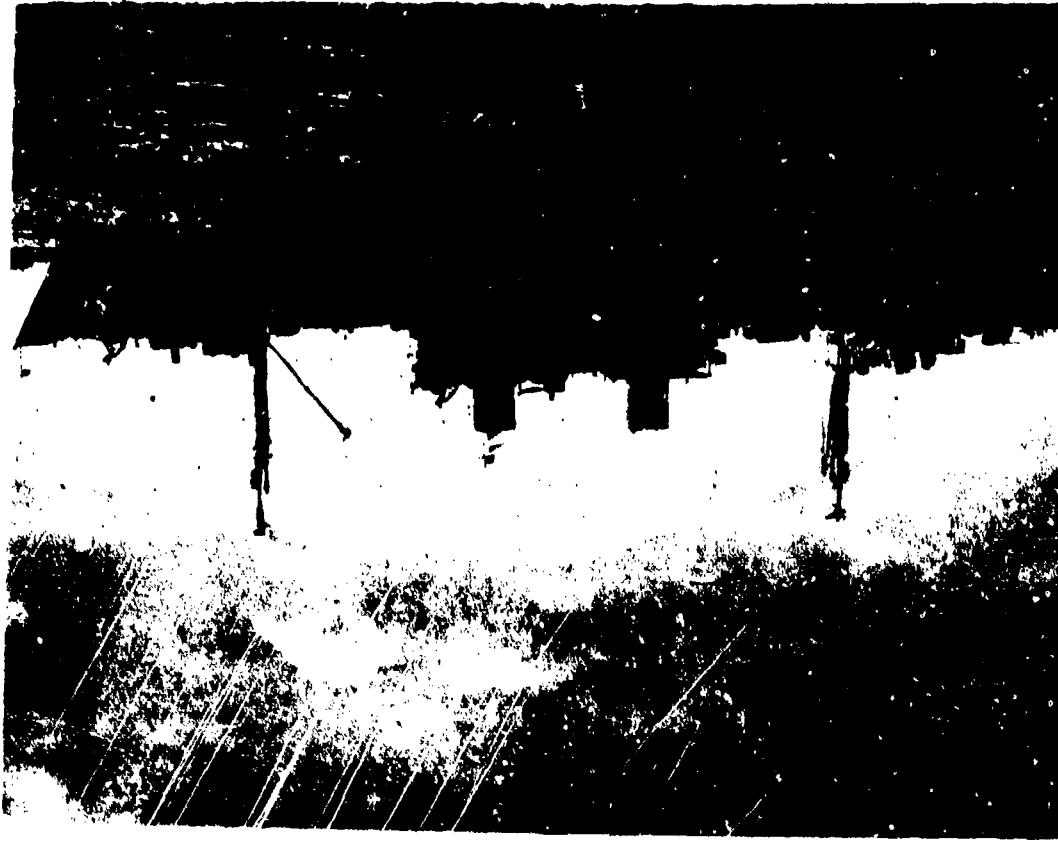


AA-CR-227-49-122. View from off starboard quarter after Test A.

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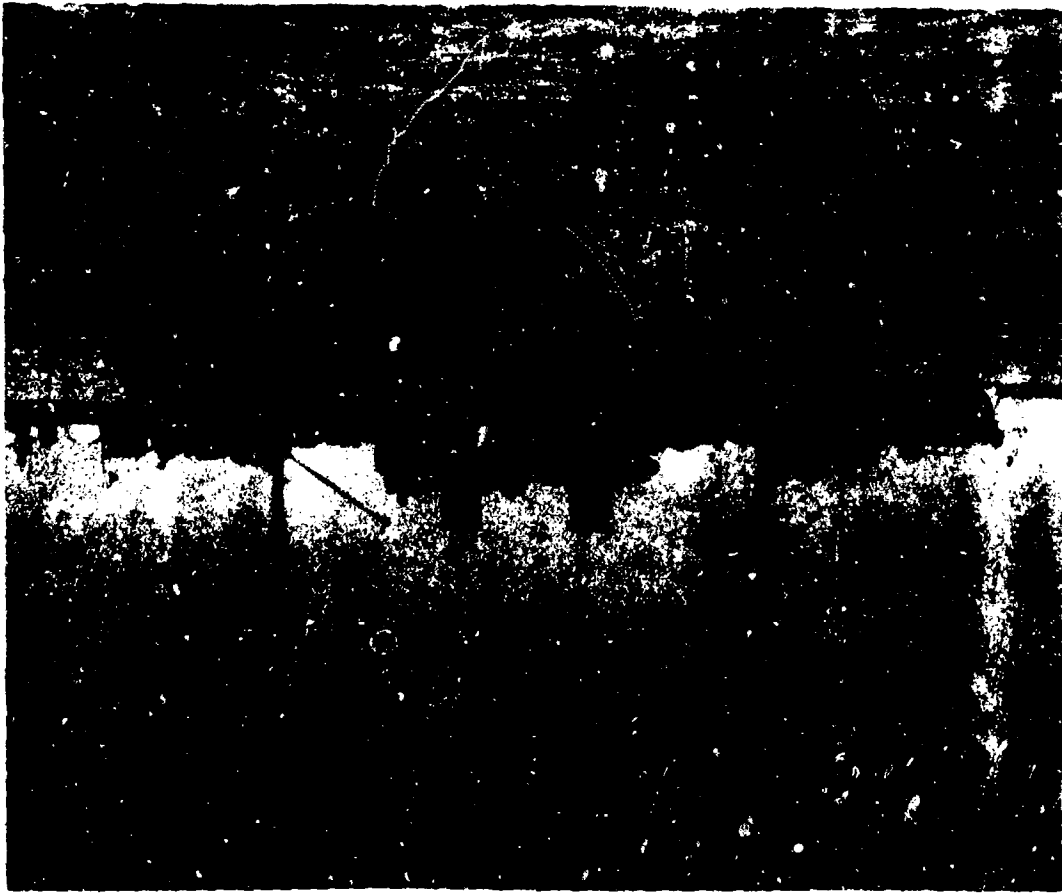
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BA-CR-196-157-5. View from off starboard beam before Test A.

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AA-CR-227-49-124. View from off starboard beam after Test A.

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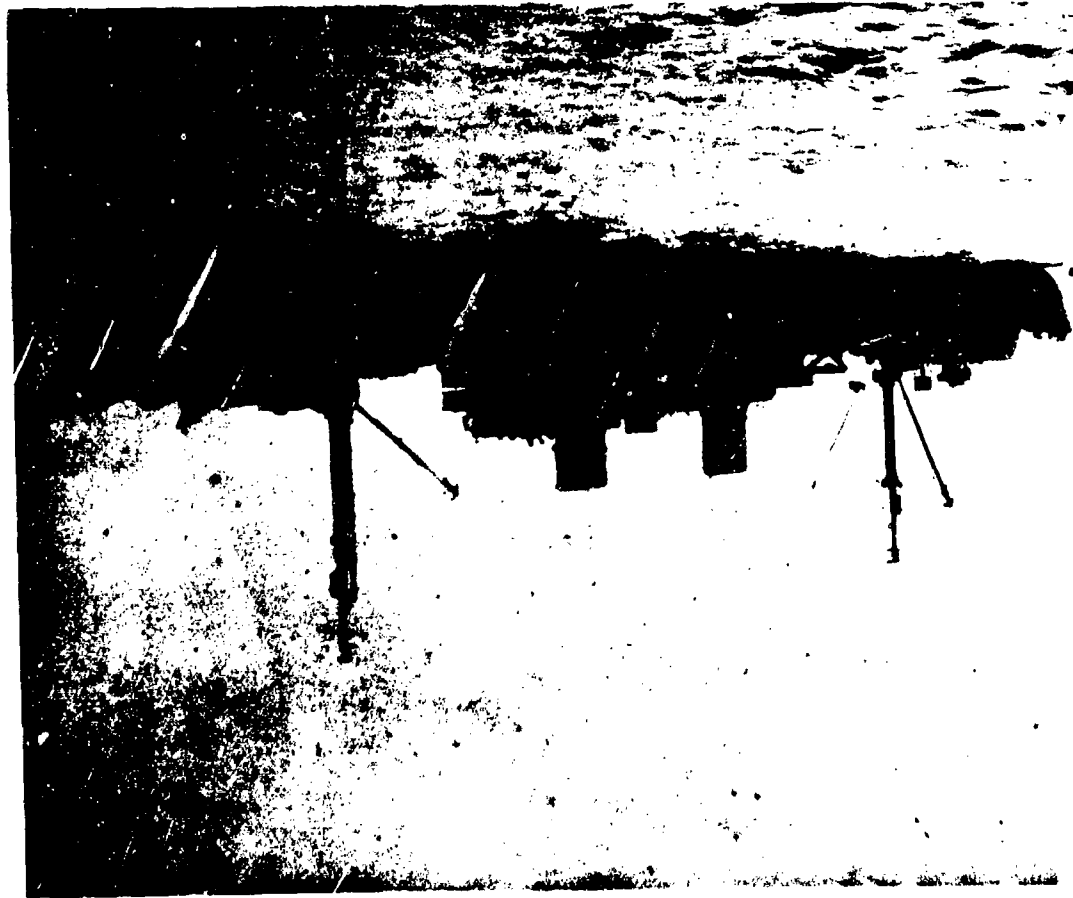
BA-JR-196-157-4. View from off starboard bow before Test A.

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AA-CR-227-49-125. View from off starboard bow after Test A.

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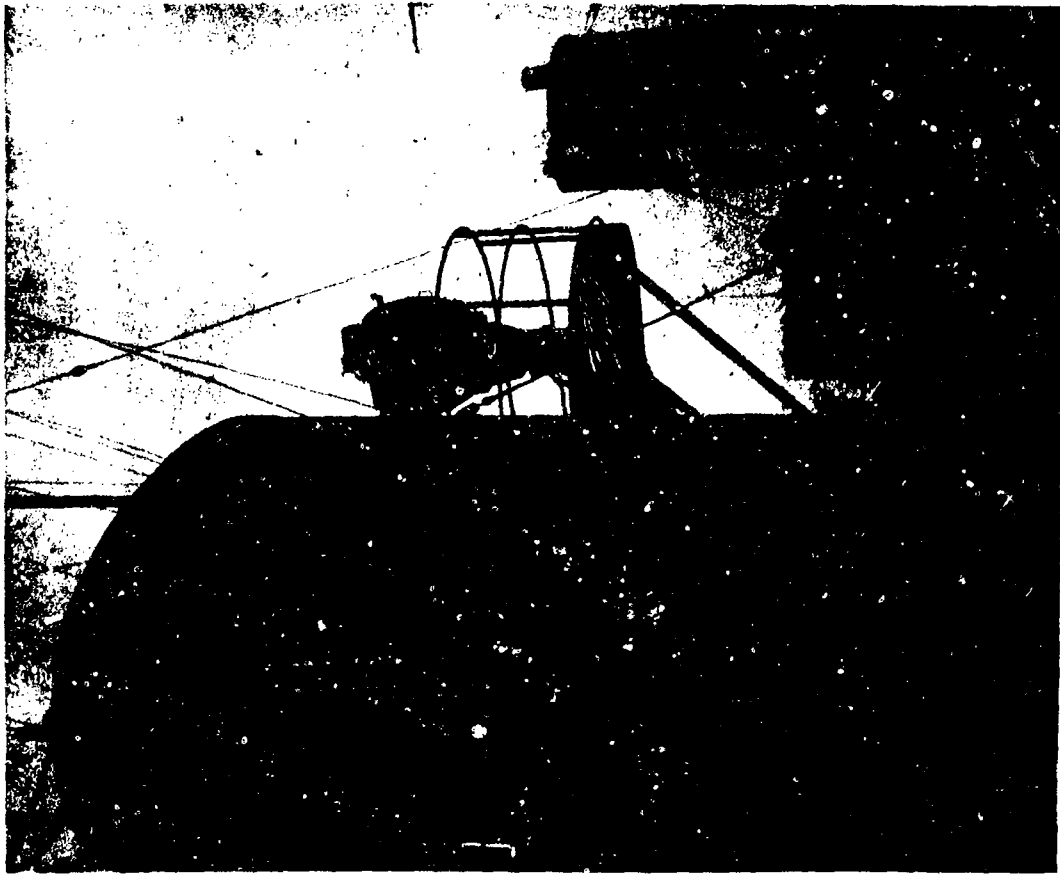
AA-CR-82-1913-2. Looking aft on starboard side of the signal bridge at damaged starboard flagbag and ladder to searchlight platform.

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AA-CR-82-1913-3. Looking aft and inboard on port side of the signal bridge at slightly damaged flagtag and ladder to searchlight platform.

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AA-CR-82-1913-4. Damaged master magnetic compass foundation on signal bridge level.

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AA-CR-82-1824-2. Damaged double door to carpenter shop, upper deck frame 130, port.

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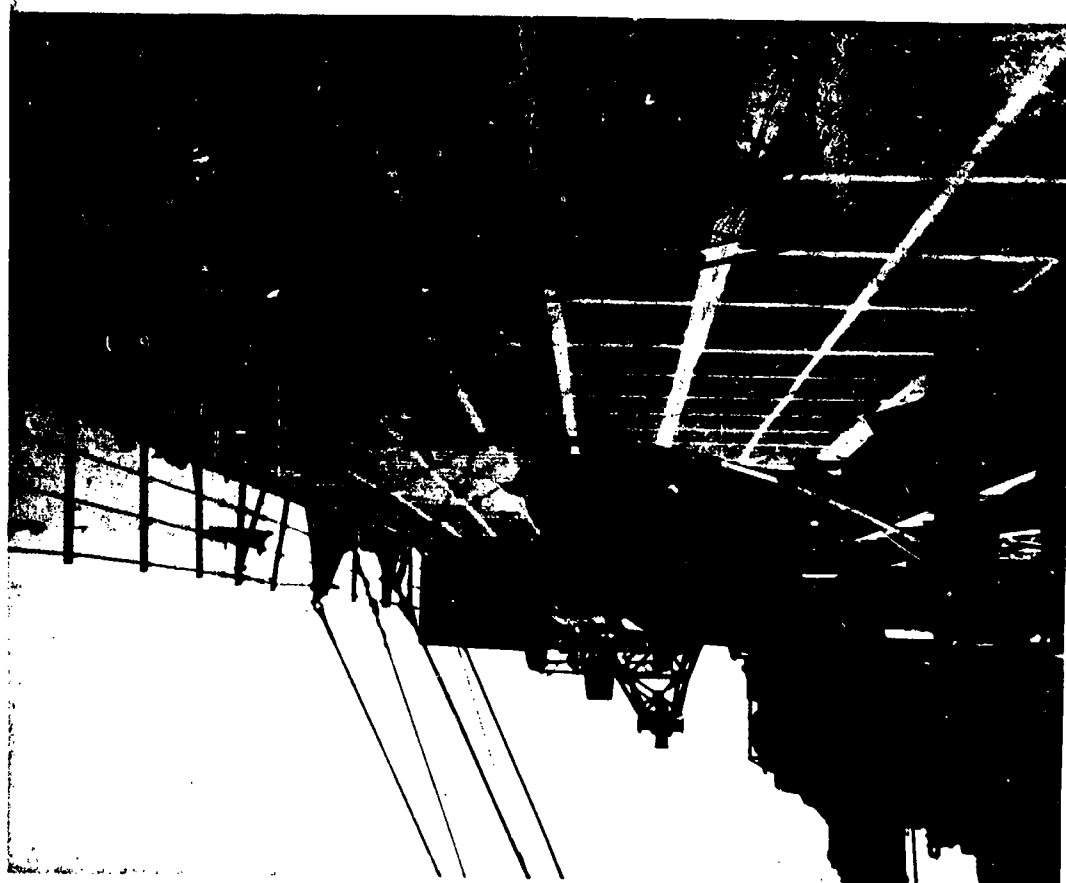
AA-CR-82-1913-7. Damaged doors in bulkhead 122, port main deck weather passageway.

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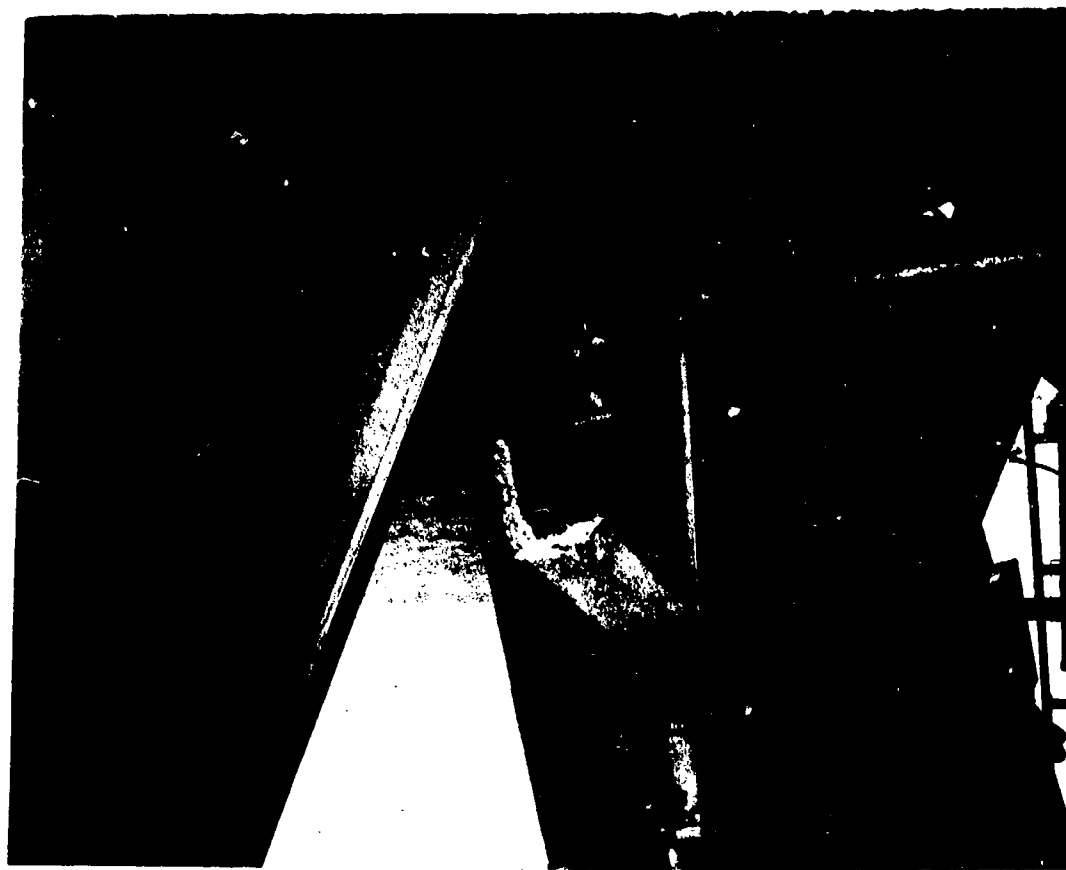
AA-CR-82-1823-12. Looking forward on starboard upper deck showing displaced manila line, cargo hatch strap, and stretcher.

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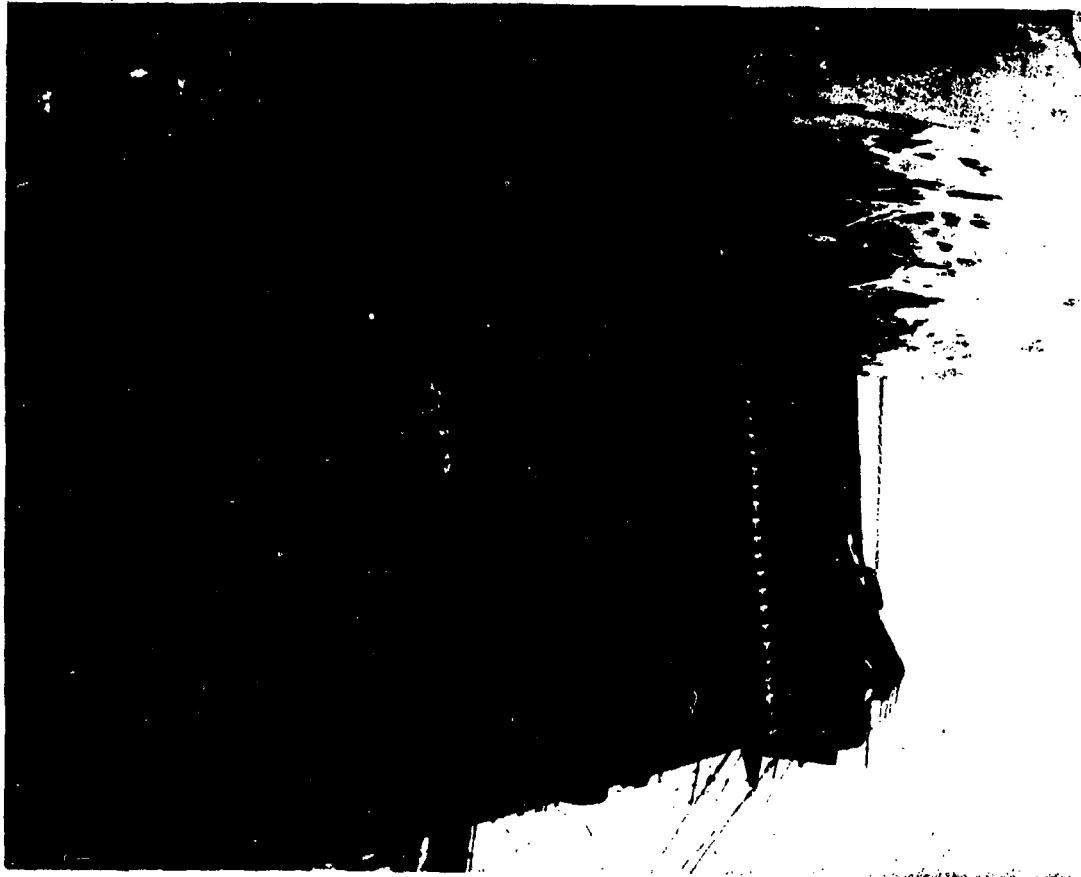
AA-CR-82-1824-3. Looking at broken life raft support at frame 88, port.

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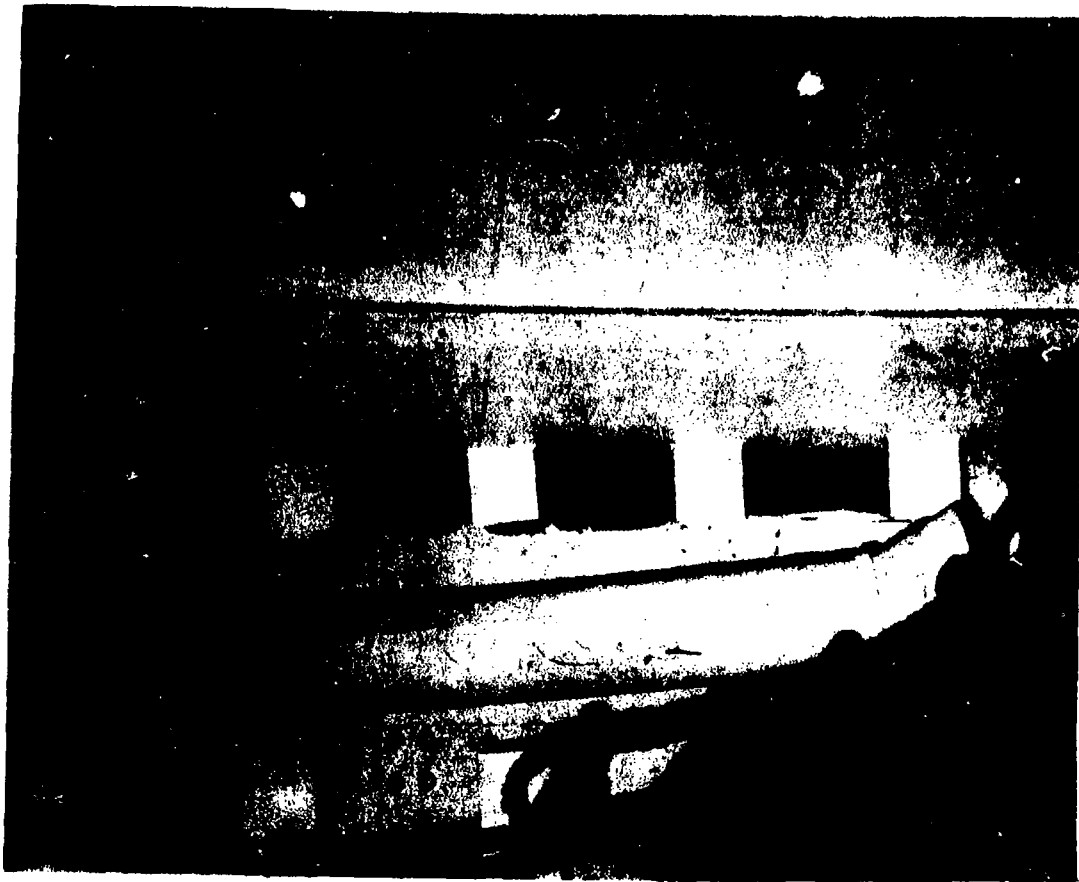
AA-CR-82-1913-12. Looking forward at port shell, frames 30 to 60.

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AA-CR-82-1913-10. Looking forward at after port side of bulkhead 40, between main and second decks showing damage in way of shell damage.

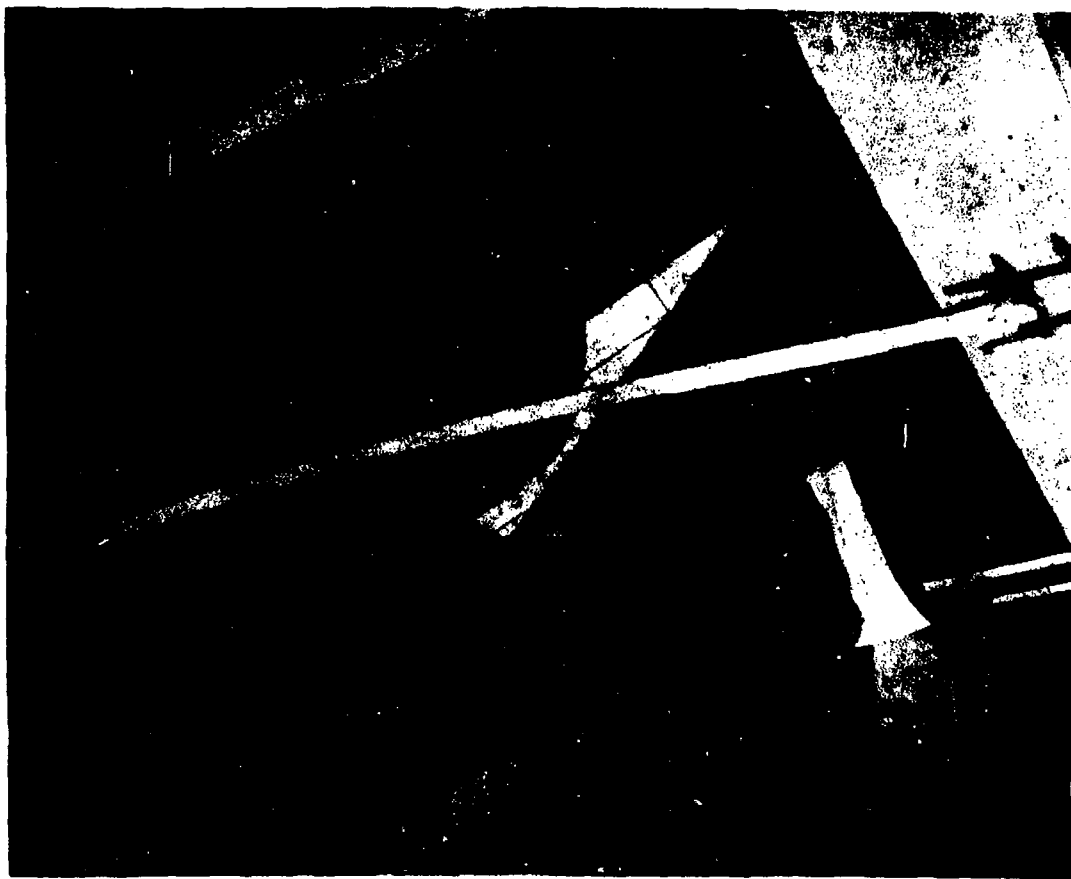
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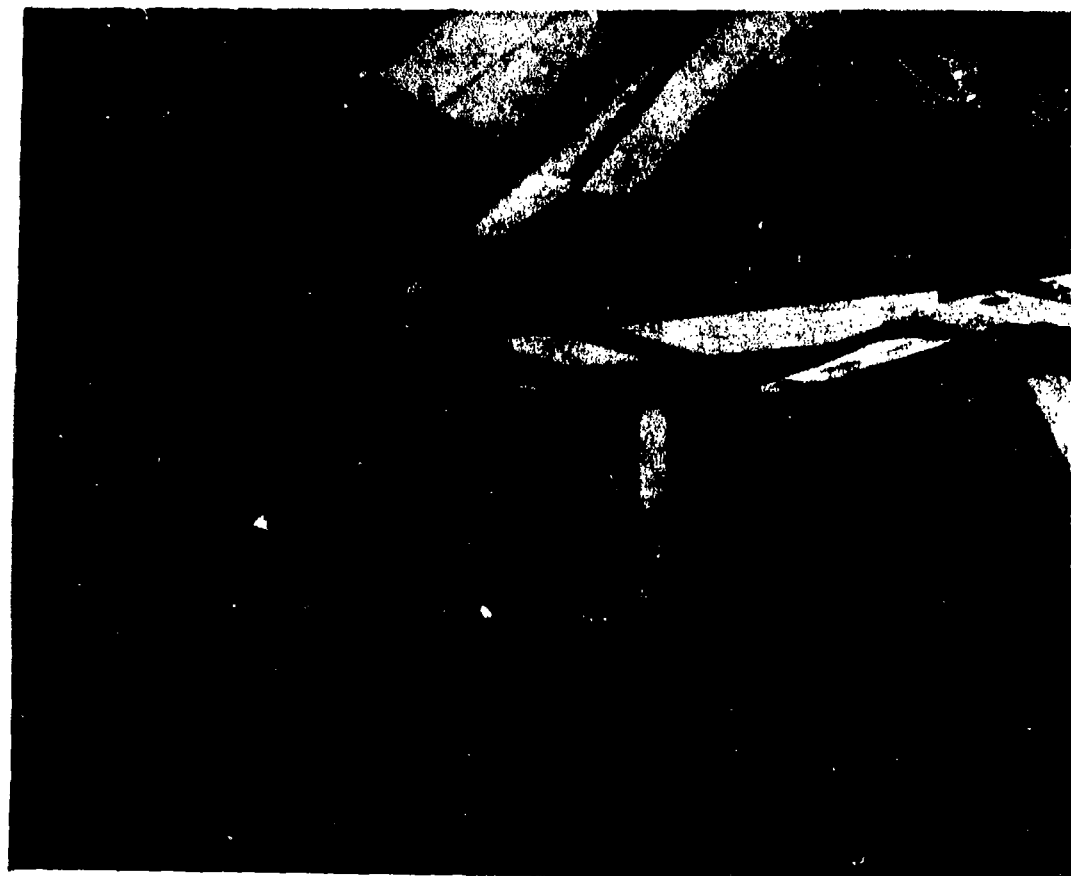
AA-CR-82-1823-9. Looking aft and to port into forward cargo hatch showing displaced battens and pontoons.

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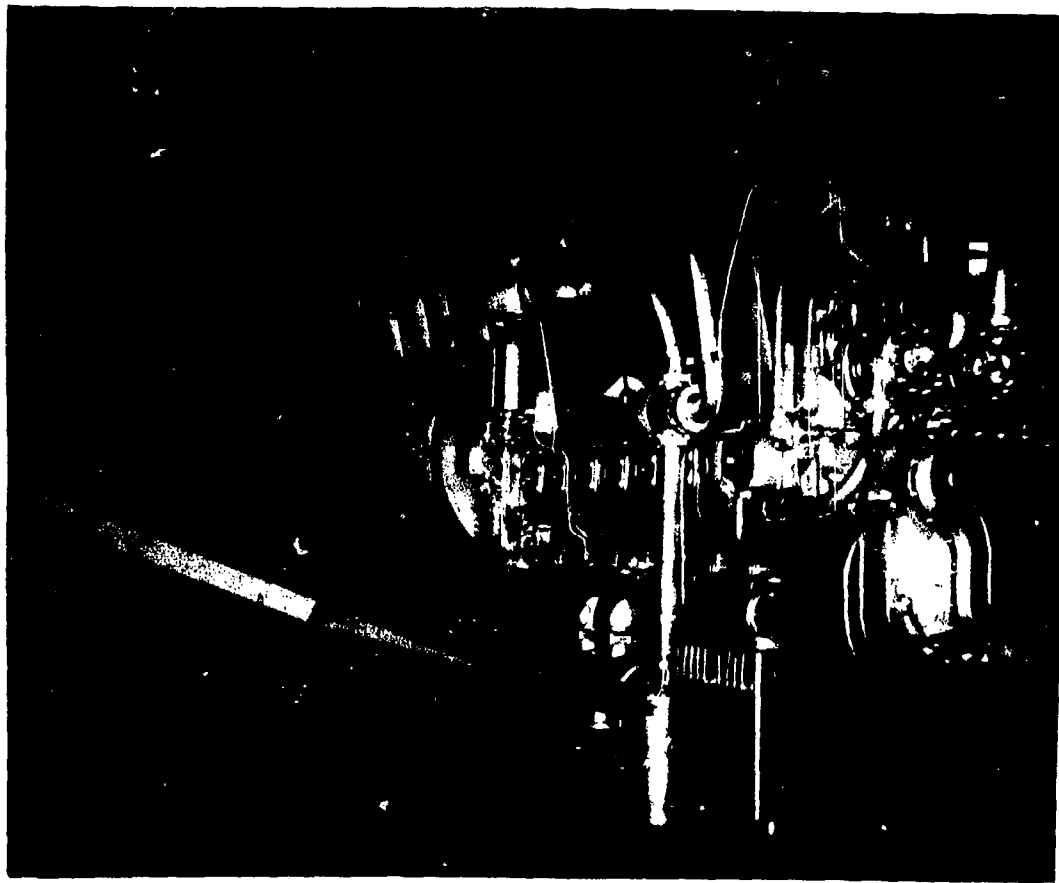
AA-CR-82-1913-8. Looking forward and to starboard on main deck in forward cargo hold.

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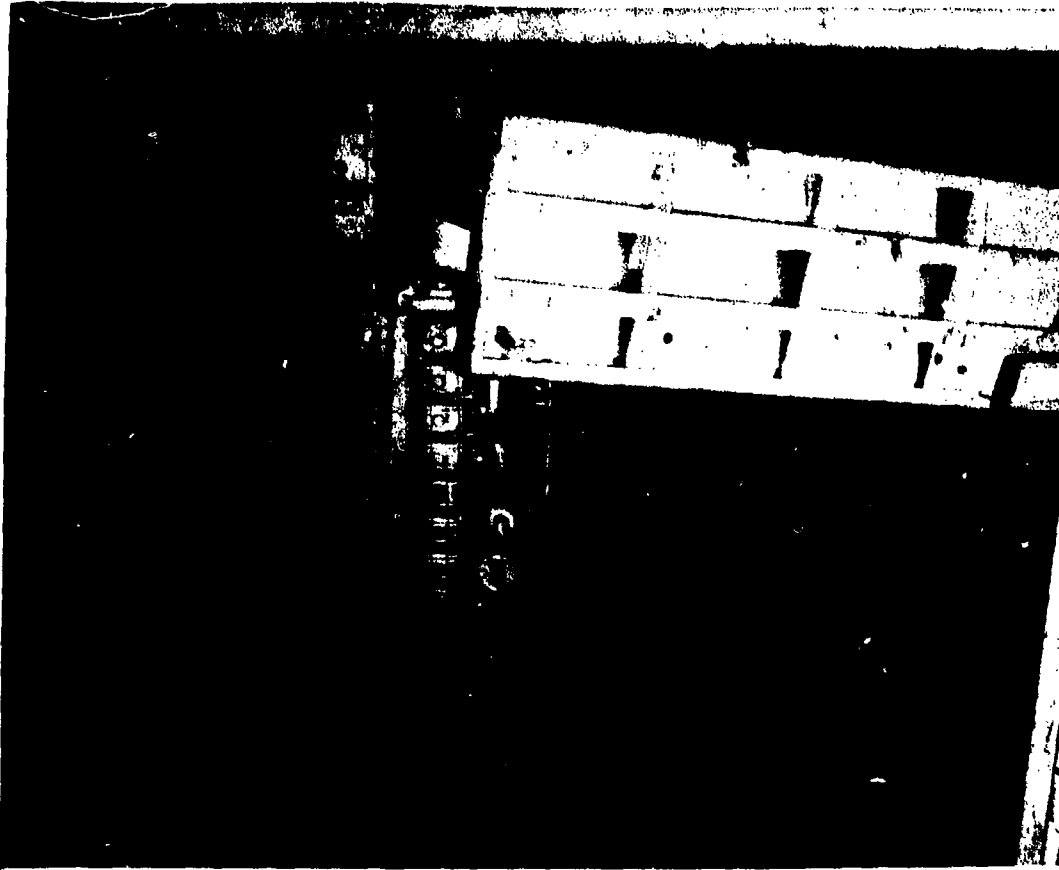
AA-CR-82-1913-11. Looking at diesel generator damaged by falling hatch pontoons in forward hold.

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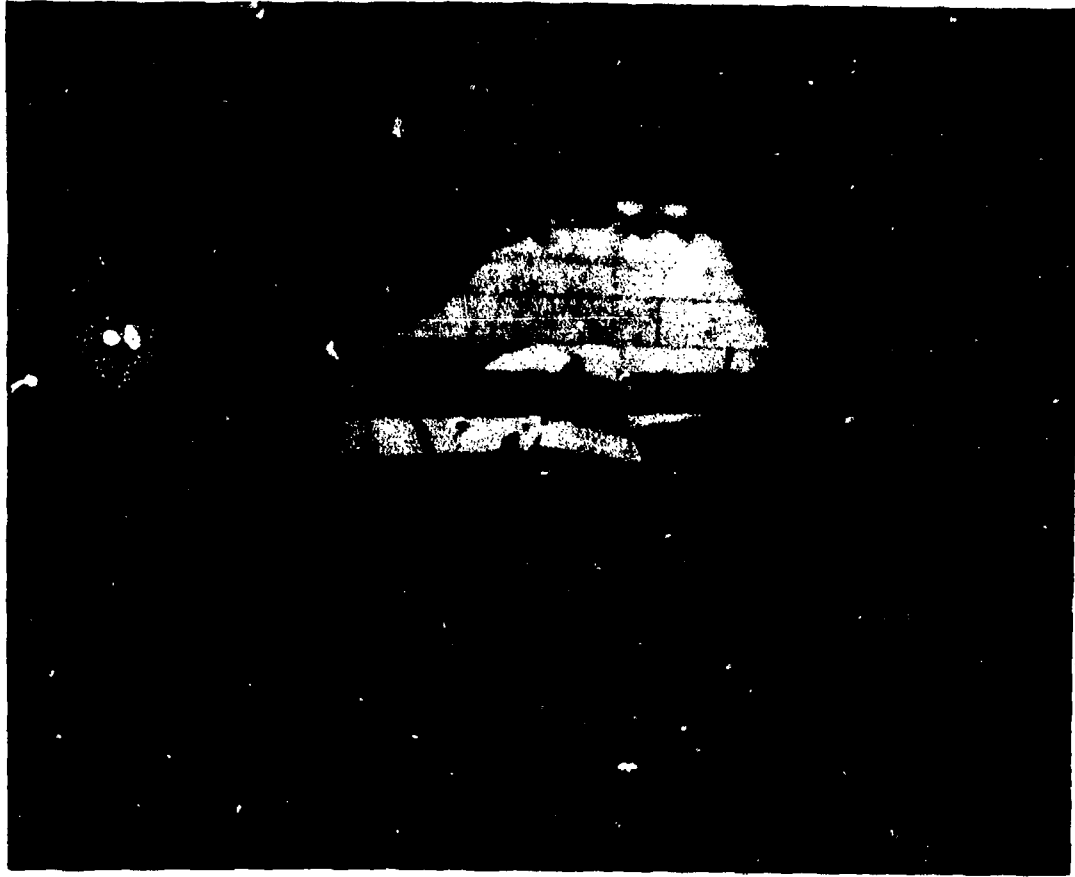
AA-CR-82-1913-9. Looking down on diesel generator damaged by falling hatch pontoons in forward hold.

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AA-CR-82-1913-5. Looking down at fallen hatch pontoons and batters in after cargo hold.

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AA-CR-82-1913-6. Looking at plane damaged by falling hatch pontoons and batters in after cargo hold.

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APPENDIX

SHIP MEASUREMENT DATA

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## SHIPU.S.S. BARROW (APA-61)

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## APPENDIX

### COMMANDING OFFICERS REPORT

#### TEST ABLE

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## REPORT #11

### COMMANDING OFFICERS REPORT

1. The damage to the BARROW during Test A was very slight.

(a) Draft after test fwd. 9.3 inches, aft 18.6 inches, no list. (Same as before test.)

(b) Structural damage: Hull was distorted between frames 32 and 55 port side. Hull plating dished inward approximately four inches at frame 40. Flag bags on signal bridge were crushed and port one bent down on the deck. No. 2 stack was dished in about one inch from superstructural deck to stay band. Uptakes were not damaged. The pontoon hatch covers on both hatches were blasted off, some falling down lower hold damaging special equipment in number one hatch and wrecking the plane in lower number two hatch.

(c) Operability of: machinery, ship control, fire control, gunnery and electronics were not impaired.

(d) Heat burned and blistered paint on port side of ship from stern to stern. Forward part of bridge port side of superstructure and stacks-Burned signal hallways of starboard yard but not the port ones. All canvas on port side including gun covers and gun cover on the 5"38 cal gun on fantail were burned or blasted off.

The personnel casualties if in combat condition would have been approximately twenty five (25) percent of topside personnel due to blast. Radioactivity effect unknown.

2. (A) Apparent direction of blast was 345 degrees relative. All equipment behavior seemed normal.

(B) The only fire noted on board ship was a mooring line on top of after deck house port side which caused armored wire in carpenter shop below to become hot and grounded by insulation being burnt off.

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(C) Shock seemed to be downward as evidence of hatch pontoons are bent downward. The scratch bar installed on second deck at frame 42 port and starboard show that the deck worked up and down as much as 3 inches above normal position and 2 inches down on port side. On starboard side the scratch show decks raised 3 3/4 inches and down 2 1/4 inches. No evidences of any joints being broken or paint knocked off could be found.

(D) Pressure seemed to cross the ship from port to starboard striking the ship at 345 degrees relative. Areas effected are noted in 1-(b) (c) above.

(E) The only peculiar effect to the Atom Bomb is that on the forward inside part of the bridge, port side the paint was blistered on doger from the heat on the opposite side. Some of the pipe railings were burned 180 degrees where as other surfaces were only burned on the side to the blast.

3. (1) There was no effect on propulsion and ship control.  
(2) There were no effects on watertight integrity and stability.

(3) The effect on the personnel estimated approximately twenty five (25) percent casualties and no effect on the habitability of the ship.

(4) The effect on the fighting ability would have been due to personnel casualties.

4. (a) There were two (2) 1 1/2 inch iron pipe on dis-tilling plant broken at the thread due to badly rusted pipe and the shock caused them to carry away.

(b) Four (4) 1 inch salt water flushing lines broken at threads as follows: One in C.P.O. head, one in mess attendants head, one in forward crews head, one in aft crews head, one flushing tank in forward crews head ruptured. (Evidence of previous weakness due to rust.)

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(c) Antennae wires were carried away, cups on anemometer gone. Blinker lights and other electrical equipment satisfactory.

(d) Flag baze crushed and bent down to the deck. Signal searchlights were not damaged. Standard compass forward of No. 2 stack blasted from deck, the binnacle destroyed the compass appar-ently not damaged as the glass not broken and the card works freely. The Gyro Repeater on starboard wing of bridge and one on signal bridge were jarred out of the gimlets.

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# **CAUTION**

This Document Contains  
ATOMIC WEAPONS INFORMATION

# **NOTICE**

This document contains atomic weapons information. Distribution is limited to recipients authorized by the Defense Atomic Support Agency (DOD) and/or the Division of Military Application (AEC)





**Defense Special Weapons Agency**  
6801 Telegraph Road  
Alexandria, Virginia 22310-3398

TRC

9 April 1997

MEMORANDUM FOR DEFENSE TECHNICAL INFORMATION CENTER  
ATTENTION: OMI/Mr. William Bush

SUBJECT: Declassification of Reports

The Defense Special Weapons Agency (formerly Defense Nuclear Agency) Security Office has reviewed and declassified the following reports:

*+ ST-A*

AD-366748 -	XRD-65
AD-366747 ~	XRD-64
AD-366746 ^	XRD-63
AD-376826 ~	XRD-60
AD-376824 ~	XRD-58
AD-376825 ~	XRD-59
AD-376823 ~	XRD-57
AD-376822 ~	XRD-56
AD-376821 ~	XRD-55
AD-366743 ~	XRD-54
AD-376820 ~	XRD-53
AD-366742 ~	XRD-52
AD-366741 ~	XRD-51
AD-366740 ~	XRD-50-Volume-2
AD-366739 -	XRD-49-Volume-1
AD-366738 -	XRD-48
AD-366737 ^	XRD-47

TRC

9 April 1997

SUBJECT: Declassification of Reports

AD-366736 -	XRD-46
AD-366735 -	XRD-45
AD-366723 -	XRD-37
AD-366721 -	XRD-35
AD-366717 -	XRD-31-Volume-2
AD-366716 -	XRD-30-Volume-1
AD-366751 -	XRD-68-Volume-2
AD-366750 -	XRD-67-Volume-1
AD-366752 -	XRD-69
AD-366744 -	XRD-61.

All of the cited reports are now **approved for public release**. **Distribution statement "A"** now applies.

*Arndith Jarrett*  
ARDITH JARRETT  
Chief, Technical Resource Center

*Completed*  
*1 Mar 2000*  
*B.W.*